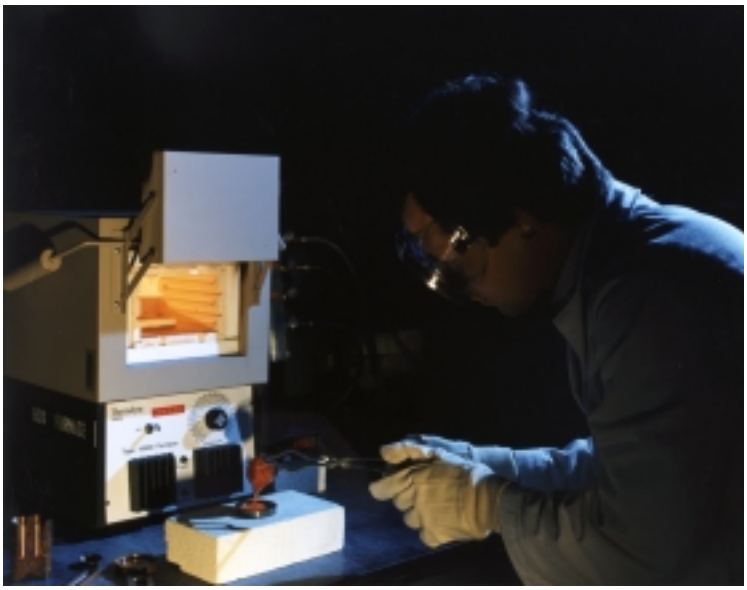
MACHINABLE CERAMIC SUPERCONDUCTORS



The Naval Research Laboratory has developed a patented process for forming a machinable, high T_c ceramic superconductor. Advantages of this process include:

- Material is machinable with conventional metal-working equipment and steel tools
- Superconducting ceramics can easily be shaped into various devices
- Very complex shapes are possible that otherwise would be very difficult to shape with brittle $REBa_2Cu_3O_7$ superconductors
- The material machined is metallic above T_c, superconducting below T_c; a good thermal conductor above T_c, a poor thermal conductor below T_c; and a good magnetic shield.

Potential high-temperature superconducting (HTS) applications include:

– Vibration dampeners (a vibrating magnet dissipates energy in an HTS sheath)
– Magnetic shields for electronic applications in which a high signal-to-noise ratio is required and cost is a consideration. (Still higher performance of shielding can be accomplished by adding additional processing steps, but at greater cost.)
– Low-cost magnetic shields for large structures or machines such as magnetic resonance imagers (MRIs).
– Thermal shields in cryogenic applications
– Thermal and electrical switching devices in the 77-110 K temperature range
– Structural parts for cryogenic applications.

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